

WHAT IS CLAIMED IS:

1. A method of identifying an object having identification information, said identification information being used to verify the identity of the object, said method comprising:

determining at least one characteristic of a magnetic field of at least a portion of a tag, thereby obtaining a first specific magnetic signal, wherein the tag comprises a substantially non-magnetic host material having pores, wherein at least some of the pores contain a magnetic material, and

storing signal information relating to said first specific magnetic signal, said stored signal information forming the identification information of the object.

2. The method of claim 1, wherein the step of determining at least one characteristic of said magnetic field of the at least one portion of said tag comprises a measurement of said characteristic of the site-specific magnetic field over a surface of said portion of the tag, thereby mapping a magnetic fluctuation signal.

3. The method of claim 1, wherein storing signal information relating to the first specific magnetic signal comprises storing data corresponding to the at least one characteristic of said magnetic field over said portion of the tag.

4. The method of claim 1, further comprising:

subsequently determining the at least one characteristic of the magnetic field of said portion of the

tag, thereby obtaining a second specific magnetic signal,  
and

comparing said second specific magnetic signal with  
the previously stored identification information.

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5. The method of claim 4, further comprising:

magnetizing the tag prior to each determination of the  
at least one characteristic of the magnetic field of said  
portion of the tag.

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6. The method of claim 1, further comprising:

recording information on the tag by magnetizing the  
magnetic material present in groups of pores into poled  
domains, or

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patterning pores of the tag with magnetic material.

7. The method of claim 1, wherein the tag is attached to the  
object to be identified after obtaining the first specific  
magnetic signal.

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8. The method of claim 1, wherein the tag is attached to the  
object to be identified before obtaining the first specific  
magnetic signal.

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9. The method of claim 1, wherein the tag comprises a  
substrate supporting the host material.

10. The method of claim 9, wherein the substrate comprises  
material selected from the group consisting of metal,  
silicon, silica, glass, plastic, ceramic and combinations  
thereof.

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11. The method of claim 1, wherein the host material is selected from the group consisting of alumina, zeolites, group III-V materials, polymers, silicon oxide, zinc oxide and tin oxide.

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12. The method of claim 1, wherein the host material comprises nanotubes.

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13. The method of claim 12, wherein the nanotubes are cast within a second host material.

14. The method of claim 1, wherein the magnetic material is selected from the group consisting of Fe, Ni, Co, their alloys, oxides, mixtures and combinations thereof.

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15. The method of claim 1, wherein the pores of the host material have a diameter between 10nm to 500nm.

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16. The method of claim 1, wherein the tag further comprises at least one coating layer.

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17. The method of claim 1, wherein said at least one characteristic of the magnetic field of the portion of the tag is highly dependent on the disorder of the tag.

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18. The method of claim 17, wherein the disorder is due to a feature selected from the group consisting of pore size, shape and orientation of pores, percentage of pore filling, crystal orientation of magnetic material in the tag, and combinations thereof.

19. A method of identifying an object having identification information, said identification information being used to verify the identity of the object, said method comprising:

5       determining at least one characteristic of an electric or electromagnetic field of at least a portion of a tag, thereby obtaining a first specific electric or electromagnetic signal, wherein the tag comprises a substantially electrically insulating host material having pores, wherein at least some of the pores contain a  
10       substantially electrically conducting material and wherein at least some of the substantially electrically conducting material is connected to a voltage source, and

15       storing signal information relating to said first specific electric or electromagnetic signal, said stored signal information forming the identification information of the object.

20. The method of claim 19, wherein the step of determining at least one characteristic of said electric or  
20       electromagnetic field of the at least one portion of said tag comprises a measurement of said characteristic of the site-specific electric or electromagnetic field over a surface of said portion of the tag, thereby mapping an electric or electromagnetic fluctuation signal.

25       21. The method of claim 19, wherein storing signal information relating to the first specific electric or electromagnetic signal comprises storing data corresponding to the at least one characteristic of said electric or electromagnetic  
30       field over said portion of the tag.

22. The method of claim 19, further comprising:

subsequently determining the at least one characteristic of the electric or electromagnetic field of said portion of the tag, thereby obtaining a second specific electric or electromagnetic signal, and

5 comparing said second specific electric or electromagnetic signal with the previously stored identification information.

10 23. A method of producing a system for object identification, said method comprising:

determining at least one characteristic of the magnetic field of at least a portion of a tag, thereby obtaining a first specific magnetic signal, wherein the tag comprises a substantially non-magnetic host material having pores, and wherein at least some of the pores contain a magnetic material,

15 storing signal information relating to said first specific magnetic signal, said stored signal information forming the identification information of an object to be identified.

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24. A method of producing a system for object identification, said method comprising:

25 determining at least one characteristic of the electric or electromagnetic field of at least a portion of a tag, thereby obtaining a first specific electric or electromagnetic signal, wherein the tag comprises a substantially electrically insulating host material having pores, wherein at least some of the pores contain a substantially electrically conducting material and wherein

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at least some of the substantially electrically conducting material is connected to a voltage source, and

storing signal information relating to said first specific electric or electromagnetic signal, said stored signal information forming the identification information of an object to be identified.

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25. A tag carrying identification information, said identification information being used to verify an object's identity, said tag comprising:

10 a substantially non-magnetic host material having pores, wherein at least some of the pores contain a magnetic material, and

at least one coating layer covering at least partially a surface of the non-magnetic host material.

15 26. The tag of claim 25, wherein said coating layer comprises a material which has a bulk yield stress greater than  $50 \text{ MN/m}^2$ .

20 27. A tag carrying identification information, said identification information being used to verify an object's identity, said tag comprising:

a substantially electrically insulating host material having pores, wherein at least some of the pores contain a substantially electrically conducting material, and

25 at least one coating layer covering at least partially a surface of the host material.

30 28. The tag of claim 27, wherein said coating layer comprises a material which has a bulk yield stress greater than  $50 \text{ MN/m}^2$ .

29. An object having a tag carrying identification information, said identification information being used to verify the object's identity, said tag comprising:

5 a substantially non-magnetic host material having pores, wherein at least some of the pores contain a magnetic material, and

at least one coating layer covering at least partially a surface of the non-magnetic host material.

10 30. An object having a tag carrying identification information, said identification information being used to verify the object's identity, said tag comprising:

15 a substantially electrically insulating host material having pores, wherein at least some of the pores contain a substantially electrically conducting material, and

at least one coating layer covering at least partially a surface of the host material.

20 31. A system for object identification, said system comprising:

25 a tag carrying identification information, said identification information being used to verify an object's identity, wherein said tag comprises a substantially non-magnetic host material having pores, wherein at least some of the pores contain a magnetic material, and

a data storage medium for storing data corresponding to a magnetic signal obtained from at least a portion of the tag.

30 32. A system for object identification, said system comprising:

a tag carrying identification information, said identification information being used to verify an object's identity, wherein said tag comprises a substantially electrically insulating host material having pores, wherein  
5 at least some of the pores contain a substantially electrically conducting material, wherein at least some of the substantially electrically conducting material is connected to a voltage source, and

a data storage medium for storing data corresponding  
10 to an electric or electromagnetic signal obtained from at least a portion of the tag.